

VIPER

VOLUME 2, ISSUE 1

AN ARESCO PUBLICATION

JULY 1979, \$2.00

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Page Code: First digit is volume number. Second and third digits are issue number. Fourth and Fifth numbers are page number. This is "2.01.00" - the cover of issue #1, Volume #2. The masthead information is on page 2.01.01; page one of issue 1 of volume 2. See the editorial for further information on Section Headings.

SUBSCRIPTION, ADVERTISING, AND MISCELLANEOUS INFORMATION

The VIPER is published ten times per year and mailed to subscribers on the 15th day of each month, except June and December. Single copy price is \$2.00, and the subscription price is \$15.00 per year and includes all ten issues of the current volume. Outside the USA, subscribers should add \$10 for postage costs.

The VIPER is an ARESCO publication, edited by Terry Laudereau. Associate Editor is Rick Simpson, Corresponding Editor is Tom Swan.

For more information about the VIPER, contact ARESCO, P.O. Box 1142, Columbia, MD 21044, or call (301) 730-5186.

The VIPER is published at 6303 Golden Hook, Columbia MD, 21044. Application for second class postage pending at Columbia MD 21045. POSTMASTER: Send all address changes to ARESCO, P.O. Box 1142, Columbia MD 21044.

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This issue is going to press on June 20, 1979, and we have received 275 renewals. As of this date, we have 542 subscribers to Volume 1. 200 copies per month are sold to dealers or to other people for resale or in-house use. We've also sold an average of 10 copies per month to people who sent in \$2.00 for a single issue. Total income to date for Volume 1: 10730. Printing: \$5000., postage, \$2100., flyers (to answer information requests): \$500., printing of the index: 480. "Profits": \$3150. That's before taxes! We have 225 complete sets of Volume 1 in stock, with limited supplies of all issues except issue #1 available as single copies. We cannot sell any #1 except as part of a set. (I forgot to mention that we reprinted #1 for \$480. We sent the first issue out to all the VIP people we knew about when we first started out last year.) Thanks again for your support!

E D I T O R I A L

by Terry Laudereau

With your first issue of Volume 2, you've probably discovered some format changes. These changes were initiated due to popular request; readers wanted a quicker, easier way to reference the material in the VIPER. In addition, readers wanted an issue-by-issue index as well as the Volume Index they received at the end of Volume 1. Since the VIPER is your newsletter, we scurried around trying to develop a way to do all this without increasing our costs. It ain't easy, folks!

Nevertheless, we're trying. If this format doesn't meet your needs, we're willing to try again - never let it be said that the VIPER is inflexible or unresponsive! As I said before, this is your newsletter - we just work here (and get to read all the letters and articles you send in!).

We've tentatively settled on several Section headings: Editorials, Reader I/O (which is letters to and from you), Music, CHIP-8 Information and Applications, Games, Hardware, Machine Code Information and applications, News From RCA, and Miscellany. In the Miscellany section, we'll put such things as hardware/software/paperware reviews, advertising, and any announcements we think will be of interest to you.

Each issue will arrive with the index on the first page (page zero) and the masthead information (which gives our ad rates, publishing info, etc.) on the second page (page 1). This page precedes everything else, and as you collect issues of Volume 2, the index pages can form a section of their own. Sometimes we might not include our personal comments - but then the Editorial pages will also contain any corrections to programs previously published. Which reminds me - notice that the games and music programs are printed with a real, live printer - not hand typed (unless the author sent us copy we could reproduce without re-typing). We sincerely hope to continue this practice - to eliminate my famous typing errors! Obviously, we hope there won't have to be any "corrections"!

This issue of the VIPER is going to press in early June so we can get it out to you earlier in the month of July, than we usually get it out. We hope to mail by the first of the month rather than the 15th - but we aren't ready to promise. It increases our turn-around time by about two weeks (so that info sent to us on the first of one month will be published in the following month's issue).

We're delighted to welcome Tom Swan aboard as our Corresponding Editor. Tom has written a magnificent book, which Rick describes at length later in this issue. With any luck, we'll get a brief biography from Tom in the next few weeks, and be able to tell you a bit more about him. Meantime, enjoy Issue #1 of Volume 2 - and don't forget to write and let us all know what you've been doing with your VIP!

READER I/O: LETTERS TO VIPER

Question: In the interrupt and display routines, is there any reason why the IDL instruction can't be used to wait for however many cycles is required for the 1861 to decide that it would like some DMA? Not only would it be easier than counting cycles for operations, but maybe it would automatically compensate for 3-cycle instructions in a program?
- Charlie McCarthy

I can't think of any reason, Charlie. Maybe a reader out there can. Let's hear from someone who knows! - Terry

Suggestions: Bring back the "What's New From RCA Corner", and call it just that! Put things always in the same order. For example, "What's New From RCA", "Studio II Conversion", ELF Conversion", "Software", "Hardware", "Corrections", etc. And put a table of contents - maybe on the front cover - in every issue. Or perhaps a KWIK index, or a volume index. Have a "news" corner. Put headings on inside top corners of pages, as in textbooks, for fast reference. I also think you should continue the Studio II/ELF conversion articles, for those who are interested, but don't let them take away from the VIP! I would like to see more software for games this year, and it would be nice to encourage readers to write programs using either assembly (machine) language for faster graphics with higher resolution, or with the Two-Page CHIP-8 from Volume 1. Animation programs would be interesting; and, finally, I'd like to know something about that "Pascal-like" language that Norm Whaland wrote about in Volume 1, issue 3, page 2. - Henry C Will IV

Wow! As you can tell, Henry, we like a lot of your ideas! You should have received your Volume 1 index by now...and we've moved to a loose-leaf format so you can segregate articles by topic
And the front cover of each issue will contain the table of contents...and there will be a Volume 2 Index...and so on and on and on. Let us know how you like the new format. And thanks again for all the good ideas! - Terry

Attention: I just wanted to call your attention to the enclosed clipping from Electronics News, April 23, 1979, as the type of thing I find very interesting as evolution in microprocessor equipment from RCA. I've been working with the COSMAC evaluation kit and the VIP system, but this Microboard modular system looks like the best yet! I'm hoping it leads to many compatible application modules, and that it will somehow fit in with your plans (whatever they may be) for the VIPER. - C Spencer Powell

Thank you. The clipping (for those of you who haven't seen it) describes Microboard as being 3 computer systems, 4 memories, and 5 expansion modules, each on 4.5 x 7.5 inch pc boards, as well

as a power converter and 3 chassis. The systems are designated CDP18S601, 602, and 603. Each contains an 1802, a crystal-controlled clock, RAM, parallel I/O ports, serial port, power-on reset, expansion interface, and sockets for user selected ROM. The memory systems are designated CDP18S620, 621, 622, and 625, and have capacities ranging from 4K to 16K (and prices ranging from \$395 to \$1,195). The expansion modules include the CDP18S641 UART interface, featuring a 20mA or an RS232C serial interface, a selectable rate of 110 thru 19,200 baud, a paper-tape-reader run control, and assignable I/O address. The combination memory and I/O unit, CDP18S660, features 40 programmable I/O lines, 2K of CMOS static RAM, and 4 sockets for up to 8K of EPROM (2708, 2758, or 2716) or 4K of mask-programmable CDP1834 ROM. Other new boards include an A/D converter, a D/A converter, and a control and display module. The line also includes the COSMAC power converter, a regulated 5v, 600 mA supply; a 5-card chassis having a pre-printed universal backplane for all five cards, a 25-card chassis, complete with case and power supply, and a PROM programmer. All the boards should be available by the end of 1979, and we'll bring you more information about them if it seems to be of interest. The big problem (as I see it) is that the Micro-board line is considerably more expensive than the VIP line; and (for me, at least) one of the things I like about the VIP is the availability of inexpensive add-ons. But we'll see. It's entirely possible that the current pricing will be cut. (It's also possible, of course, that the prices will be raised.) In any event, we'll keep you posted. - Terry

More Corrections? I hate to sound like a nit-picker, but in using Udo Pernisz's "Lunar Lander" (See the March issue), it looks like "overflow" was partially left out of the picture, so to speak. The provision to display the word "overflow" is only partially shown. I traced the fault to a missing line of data and a mis-typed CHIP-8 command. To rid the overflow from looking like it "crashed", change 03D8 from 6B81 to 6B18. This will display the characters at the bottom of the screen. The word "flow" is left out, and to correct this, add at 0490: 89 89 00 D1 51 55 CE. This added data won't interfere with the dynamic memory locations - because it was meant to be there. Now for a question: I have recently been in touch with a firm called "Cuddly Software", that has two programs for sale. The first is called "CSOS-31", a set of "useful" routines for the 1802. One of these is a routine which will add a byte to a memory location and move the lower bytes down a location. There is another routine that does just the opposite. The second program is an "1802 simulator" that runs on the 1802. It allows one to see the registers, etc. Has anyone bought any of this software? Could anyone tell me if it is really useful? At \$15/program, I'd like to

see what someone else thinks of them before I buy them! Please ask your readers. - Garrett Guske

Well, now, the day we received your letter, we also received a package from this firm with the startling name of "Cuddly Software", and it seems that the programs you mentioned just happened to be inside! Rick has spent a bit of time looking at the material (and is impressed enough to want to send it to one of our revered reviewers), and although at the time I'm typing up this part of the issue, the review isn't done, it will be shortly. If it isn't in this issue, look for it next month - and we'll be glad to tell you whether we think it's worth your \$15! - Terry

Game Improvements: As soon as I saw issue #9, I had to try the improvements suggested by Phil Sumner for "VIP Kaleidoscope". Since I have the VP-590 Color Board, it was necessary to re-write it in CHIP-8X. I enclose my adaptation, which includes a background color change option. Also, the schematic diagram of the VP-590 furnished by RCA is practically unreadable. The reproduction was very poor. So I reconstructed the schematic in a somewhat different form that is easier to understand. I had to dig quite deep for the information, but I think I have it all correct. I enclose copies of that effort, too. - Bob Hayes

Your adaptation of Phil's improvements are printed in this issue (in a different section) - I'm certain a lot of people will find that it makes a big difference! As for your schematic, we agree that it's easier to understand. We can't publish it without RCA's permission (as you probably guessed), but we're sending a copy of it to Vic Houk. If RCA cannot permit us to publish it, perhaps they will! If so, I'm sure they'll be in touch with you....but be prepared to wait awhile to hear from them. - Terry

Terry - Please let it be known that I am willing and able to assist prospective contributors in preparation of text for their articles. If ideas are submitted to me typed, or in very clear handwriting, or on audio cassette, I will assist in organizing the material into clear, concise presentation. My background includes over a dozen published articles, a minor in English, and some editing experience for a staff newsletter. Of course, I would expect to share the by-line. I'd also like to correspond with other readers, to learn or teach programming techniques, both for machine language and CHIP-8. And, finally, I'm writing a "busy box" program that I believe would be useful as a demonstration of a VIP system without any attachments other than the cassette player and monitor. I hope to have it finished by late summer. Interested? - Eugene Fleming, 1327 Prairie Road Colorado Springs, CO 80909

Eugene - You bet we're interested! We've printed your name and address here so people can contact you directly for assistance. Should people contact you for programming help, perhaps you can get a VIP group going! - Terry

BACH PRELUDE IN C MAJOR
Arranged by L. R. Clock

0259 FF
0270 1301 C014 0800 FD13 01D0 1401 B0FD 1301
0280 D014 0000 FD13 01D0 1408 00FD 1301 D014
0290 01B0 FD13 01B0 1421 F0D0 1301 E015 01E0
02A0 FD13 01C0 1400 0000 0000
0300 0102 0A00 1A2A 003A 4A5A 6A00 7A8A 0094
0310 9D00 A0AA 00B4 C4D4 DC00 E4E9 0000
0380 0102 0300 080D 0012 1A22 2A00 3233 0036
0390 3C00 3F43 0047 5767 7700 8184 0000
0400 00E0 100F 100B 100F 10A8 0010 0F10 0B10
0410 0F10 0D09 0809 0409 0809 0612 1012 0F14
0420 1012 0FOB 0AOB 060B 0AOB 0814 1214 0F14
0430 1214 100D 0COD 080D 0COD 100A 080A 100A
0440 080A 0FOB 0AOB 0FOB 0AOB 0F08 0608 0F08
0450 0608 0DOA 080A 0DOA 080A 0D06 0406 0D06
0460 0406 0B08 0608 0B08 0608 0B05 0305 0B05
0470 0305 0A06 0506 0A06 0506 0B0A 0B06 0D0B
0480 0D06 0F0D 0F06 100F 1006 9232 1417 1217
0490 1017 0F17 6D20 2F10 120F 104D 0B6B 60A0
04A0 0010 0F10 0B10 0F10 6D60 000F 0D0F 090F
04B0 0D0F 6C60 0D08 0608 0D08 0608 0C06 0406
04C0 0C06 0406 0D08 0608 0D08 0608 0FOC 0A0C
04D0 0FOC 0A0C 302F 3032 2F2D 2F30 2D2C 2D2F
04E0 2C28 202D 2F2D 4COD ADE0 0000
0500 00E0 E464 2028 6960 6A20 2A6B 606C 202C
0510 6D60 2626 2626 2B2B 2B2B 2424 2424 2A2A
0520 2A2A 2323 2323 2828 2828 2121 2121 2626
0530 2626 E666 60A0 6020 2B2A 2B66 6B60 A064
0540 6069 6063 6068 6004 100F 1004 100F 1003
0550 0F0D 0F03 0F0D 0F04 100F 1004 100F 1008
0560 1412 1408 1412 140D 140C 140D 140A 120B
0570 120A 120B 1208 1009 1008 1009 1006 0F80
0580 2166 68A1 E000 0000

(Editor's Note: The above Supersound code came to us with this cover letter: "My first and only attempt at "writing" music for the SUPERSOUND card using a friend's VIP system. I don't own a VIP!")

COSMAC CONCERTO

by Tom Swan

I finally have a complete COSMAC. When I became the father of my VIP (literally, I had to build mine, an early version, from a kit), the I/O ports and electronics were not included. For various reasons, I waited until last week (April 22) to make the additions, and then spent an hour between the magazine covers looking for something to run, spin, beep, or boop.

Then I remembered an article in VIPER (January, 1979) describing a music program and a simple circuit to amplify the Q line and drive a small speaker. Worked perfectly, and proved my solder job hadn't jolted any of the sensitive CMOS chips here in our groundless, two-prong town in Mexico. (Our house is wired with zip cord, by the way. There are no electrical codes, nothing is grounded...the whole city is cement, so it won't burn anyway. Nor fire company (or fires, of course) either!)

Working out the notes was a chore, however, and the next step was to have the computer compose a song. Carmelo's original program was relocated to run at 023E, and the actual composition is handled by the CHIP-8 interpreter, largely to take advantage of the random number generator. It takes 3 seconds to write a 40 second tune (times vary, though), and afterward, a question mark is displayed in the center of the screen. Key F will then replay the same song. Any other key will generate a new sequence of notes. The VIP doesn't have to be reset between runs, and songs may be stored on tape by recording one page at ML 0400. Saved songs may be played on re-start by using the original machine language sub at ML 0000. The following program would need a "jump" instruction at ML 0200 (122A: GOTO 022A) in order to defeat the song generation and play a song previously taped. Otherwise, a new song would be created automatically on re-start.

The CHIP-8 portion of the program is relatively straightforward. Two nearly identical sections (0204-0210 and 0212-021E) generate first a random number from 02-A4 (hex) for the note duration, then a second random number from 10-4C (hex) for the pitch. This technique of generating numbers within a range not equal to the bit mask used is very helpful in other programs, and I use it all the time. (Remember that the KK mask in CXKK must contain a solid line of bits in the binary number, reading from right to left. In other words, 7F (hex) or 0111 1111 in binary, is a valid mask, while 7A (hex) or 0111 1010 is not.) If you want a random number ranging from 02 to A4, as I did for the note duration, first subtract the lower number from the higher (A4-02=A2) and continue to generate random numbers, throwing out any number larger than A2 to get a number in the range 00-A2. (Do this using the next highest mask above the

upper range. For A2, then, the mask had to be FF. For 42, 7F is the valid mask.) Then add the low limit back to the number (plus 02, in the example) and the random number will be in the desired range (02-A4 here).

Except for some changes to the original music program, nothing else needs explaining. The "?" is displayed, the keypad is tested, and a jump to the machine language sub or a restart to 0200 is done, depending on the key pressed.

The machine language subroutine at 023E does demonstrate how careful stack control becomes necessary when calling MLS's from CHIP-8 programs. On entry to the sub, the stack is first decremented by a 22 instruction before turning off the fideo, because the 61 instruction automatically increments R(x). Thus, the increment is cancelled out. X is then made equal to F for using RF as a data pointer to access the notes of the song. Except for branch address changes and the change of registers for data processing, the program is the same as the original, almost to the end.

At ML 0286, it is necessary to reset the stack pointer to equal 2 (for using R2 as the pointer). Although the interpreter would do this in the fetch and decode routine, the upcoming 69 instruction (to turn on the video) causes the byte on the memory bus (the value is, of course, not important) to be stored at the byte addressed by RX. Were R2 not to be on the stack pointer, this byte would be placed at the end of the song, via RF, causing a possible run-away condition on a replay of the same song. Songs must end with a 00 byte which cannot be changed on replays.

Then, after the E2 instruction, the stack pointer is again decremented to a free location (the 22 instruction at 0287), the video is turned on...which places the byte on the bus on the stack in the free spot...the stack pointer is re-incremented to point to its original position and a D4 is executed to return to the CHIP-8 program. Whew! But it is important to be careful with details such as this in your machine language subroutines!

(Some readers may "catch" me here. In this particular program, the decrement and increment instruction at the subroutine end may be left out. But if the calling CHIP-8 routine were a subroutine itself, or if any other information is stored on the top of the stack, the return addresses or needed bytes would be destroyed. Mishandling the stack is a good way to throw a bug (la Pince Cucaracha, here in the Sierra Madres) into a program.)

You may want to expand this program to interact with the user in a more sophisticated fashion. ML 0251 holds the tempo variable, and 027E is responsible for the timing between notes.

(Use higher values for staccato, lower for legato.) The user could enter values for each, or the same song could be listened to with new numbers, or maybe new numbers could be randomly generated by the VIP. (One nice effect is produced with ML 0251=06 and 027E=02. I get many long, low tones interspersed with high pitched, short passages, using this combination.)

The song length may be varied with the value set into V2 at ML 0200. FF is the highest possible value, which will cause two pages (0400 and 0500) to be filled with notes. Double-precision arithmetic, and possibly a relocation of the song (0300 is available) would be necessary for longer tunes.

I am very interested in seeing a routine that produces music which doesn't sound quite so random. Several algorithms are available, but to use them, another way to produce sounds would be needed. (This method inherently produces long low tones and short high ones. But not always.)

A friend (who once played the French Horn with the Pennsylvania Brass Quintet) tells me my Cosmac Concerto sounds better than John Cage. Or at least, as good. I'm sure I agree!

Good luck with your programming, and please feel free to write to me.

COSMAC CONCERTO

| | | |
|------|------|------------------------------------------------------|
| 0200 | 627F | V2=Loop counter for 147 notes (254 bytes) |
| 02 | A400 | I=0400 - storage area for music |
| 04 | C0FF | V0=RND # with FF mask - duration |
| 06 | 61A2 | V1=A2 for range test |
| 08 | 8105 | V1=V1-V0 --subtract A2-RND #, if neg, then RND# > A2 |
| 0A | 4F00 | Skip VF ≠ 00 (not negative) |
| 0C | 1204 | Else loop for a valid number in 00-A2 range |
| 0E | 7002 | V0=V0+2 add 2 to bring up to range 02-A4 |
| 0210 | F055 | Store V0 @ I (I+1) |
| 12 | C07F | V0=RND # with 7F mask - pitch |
| 14 | 6142 | V1=42 for range test |
| 16 | 8105 | V1-V0 -- subtract 42-RND #, if neg, then RND # > 42 |
| 18 | 4F00 | Skip VF ≠ 00 (not negative) |
| 1A | 1212 | Else loop for a valid number in 00-42 range |
| 1C | 7010 | V0=V0+10 add 10 to bring up to range 10-4C |
| 1E | F055 | Store V0 @ I (I+1) |
| 0220 | 72FF | V2 + FF (-01) subtract 1 from loop count in V2 |
| 22 | 3200 | Skip when V2 = 00 |
| 24 | 1204 | Else loop until memory block filled |
| 26 | 6000 | Set V0=00 |
| 28 | F055 | Store as end of song marker |
| 2A | 023E | Do MLS @ 023E Play song |
| 2C | A290 | I=display pattern |
| 2E | 6020 | V0=20 (VX for display) |

My neighbor Bill helped me put this together. I hope you enjoy it.

Use the music program and circuit published in the January 1979 VIPER. Set ~~int~~ 0011 = 12 and 003E = 04 and run.

| | | |
|------|------|---------------------------------------------|
| 0230 | 6108 | V1=08 (VY for display) |
| 32 | D016 | Display pattern to mark end of song |
| 34 | F20A | V2=Key pressed - wait for instructions |
| 36 | D016 | Erase pattern |
| 38 | 420F | Skip V2 ≠ 0F |
| 3A | 122A | Go 022A - play song over when Key F pressed |
| 3C | 1200 | Go 0200 - go generate new song - other keys |

PLAYSONG - MACHINE LANGUAGE SUB

| | | | | | | | | |
|-------|----|----|----|----|----|----|----|----|
| 0238* | XX | XX | XX | XX | XX | XX | 22 | 61 |
| 0240 | EF | F8 | 04 | BF | F8 | 00 | AF | F0 |
| 0248 | 32 | 86 | AE | 1F | 63 | 2F | F0 | AD |
| 0250 | F8 | 03 | AC | 8D | FC | B4 | 33 | 60 |
| 0258 | 31 | 5D | 7B | 30 | 60 | 7A | 30 | 60 |
| 0260 | 8D | FF | 01 | 3A | 61 | 8C | FF | 01 |
| 0268 | AC | 3A | 73 | 8E | FF | 01 | AE | 3A |
| 0270 | 50 | 30 | 7B | C4 | C4 | 30 | 77 | 30 |
| 0278 | 79 | 30 | 53 | 7A | 1F | F8 | 08 | EA |
| 0280 | 2A | 9A | 3A | 80 | 30 | 47 | E2 | 22 |
| 0288 | 69 | 12 | D4 | 00 | 00 | 00 | 00 | 00 |

*XX's = Part of Chip-8 program

DISPLAY PATTERN

| | |
|------|------|
| 0290 | F090 |
| 92 | 2040 |
| 94 | 0040 |

PONCHO'S PANACEA

| | | | | | | | | |
|------|------|------|------|------|------|------|------|------|
| 0046 | 0833 | 0833 | 0A24 | 0A24 | 0D1B | 0D1B | 2115 | 371B |
| 0056 | 1015 | 1212 | 1015 | 0E19 | 0D1B | 1015 | 1D19 | 311F |
| 0066 | 0833 | 0833 | 0A27 | 0A27 | 0C1F | 0C1F | 1D19 | 311F |
| 0076 | 1015 | 1212 | 1015 | 0E19 | 0D1B | 0C1F | 1B1B | 0A24 |
| 0086 | 0833 | 0833 | 0833 | 1524 | 0D1B | 0833 | 0833 | 0833 |
| 0096 | 1524 | 371B | 0A24 | 0A24 | 0A27 | 0A27 | 092D | 092D |
| 00A6 | 1833 | 0833 | 0833 | 0833 | 1427 | 0C1F | 0833 | 0833 |
| 00B6 | 0833 | 1427 | 311F | 1015 | 1212 | 1015 | 0E19 | 0D1B |
| 00C6 | 0C1F | 2B24 | 094C | 0433 | 0433 | 0433 | 0A24 | 061E |
| 00D6 | 0433 | 0433 | 0433 | 0A24 | 271B | 0524 | 0524 | 0527 |
| 00E6 | 0527 | 042D | 042D | 1233 | 0433 | 0433 | 0433 | 0A27 |
| 00F6 | 061F | 0433 | 0433 | 0433 | 0A27 | 121F | 0815 | 0912 |
| 0106 | 0815 | 0719 | 061B | 061F | 1524 | 0614 | 0711 | 0614 |
| 0116 | 0517 | 0519 | 041D | 0622 | 0514 | 0611 | 0514 | 0417 |
| 0126 | 0419 | 031D | 0522 | 0412 | 0710 | 0412 | 0315 | 0317 |
| 0136 | 021B | 031F | 0312 | 0410 | 0312 | 0215 | 0217 | 011B |
| 0146 | 031F | 0422 | 0424 | 0427 | 042A | 062D | 0730 | 0000 |

RELATIVE BRANCHING
IN CHIP - 8

by Wayne Smith

Although CHIP-8 is reasonably easy to use, I consider the absence of "labels" to be a serious shortcoming. When a program is written, all branch addresses must be absolute, and if it is later necessary to move or re-arrange the code (for example, to add or remove a section, or to reposition a subroutine) the branch addresses must be changed. This is time consuming and may introduce program errors.

A partial solution might be to add a pair of "relative branch" instructions to CHIP-8 that would "goto" the current instruction address plus or minus up to 255 bytes:

- BFMM Go to current instruction location
plus MM bytes (branch forward)
BBMM Go to current instruction location
minus MM bytes (branch backward)

Use of these two new CHIP-8 instructions to branch within a subroutine would make it possible to move the whole subroutine within memory without having to recompute branch addresses.

The new instructions replace the regular CHIP-8 BMMM instruction (Go to OMMM+V0) which isn't even used in any of the twenty game programs supplied with the VIP. The BMMM instruction occupies 01A4-0B3 (16 bytes). The unused area 01F2-01FB (10 bytes) is also used. (NOTE: It might be possible to combine these two branch instructions with the three I/O instructions proposed by Rick Simpson, using the filler area from 00FC to 0104. See the article by Rick in Issue 3, Volume 1 VIPER, page 4.)

| <u>ADDRESS</u> | <u>BYTE</u> | <u>1802 INSTRUCTION</u> | <u>COMMENTS</u> |
|----------------|-------------|-------------------------|--------------------------------|
| 01A4 | E5 | SEX R5 | |
| A5 | 86 | GLO R6 | :R6.0 = FK. If "K" = "B", DF=0 |
| A6 | FC | ADI '04' | If "K" = "F". DF=1 |
| A7 | 04 | | |
| A8 | 85 | GLO R5 | :Get MM into D |
| A9 | 33 | BDF 'F2' | |
| AA | FF | | :SUBTRACT MM (BBMM) |
| AB | F7 | SM | |
| AC | A5 | PLO R5 | |
| AD | 33 | BDF 'FA' | :Branch if no borrow |
| AE | FA | | |

| | | | | |
|------------------------|----|-----|------|-------------------------------------------------------------------|
| 01AF | 95 | GHI | R5 | : Subtract |
| B0 | FF | SMI | '01' | : the |
| B1 | 01 | | | : Borrow |
| B2 | 30 | BR | 'F9' | : |
| <u>: ADD MM (BFMM)</u> | | | | |
| 01F2 | F4 | ADD | | : Branch to here from 01A9 |
| F3 | A5 | PLO | R5 | |
| F4 | 3B | BNF | 'FA' | : Branch if no carry |
| F5 | FA | | | |
| F6 | 95 | GHI | R5 | : Add |
| F7 | FC | ADI | '01' | : the |
| F8 | 01 | | | : carry |
| F9 | B5 | PHI | R5 | : Branch to here from 01B2 |
| 01FA | 25 | DEC | R5 | : Originally, R5 → 2nd byte of instruction. Branch here from 01F4 |
| 01FB | D4 | SEP | R4 | : Return |

FAST, SINGLE-DOT DXYN

by Wayne Smith

The CHIP-8 display instruction, DXYN, is quite powerful - and a little slow. Especially if the pattern being displayed is a single dot. For N=1, the DXYN instruction takes a minimum of 82 instructions (plus 34 instructions for interpretive "overhead"). The following code is a specialized replacement for DXYN to set and test only one dot at location X, Y. It requires only 35 instructions (plus 34 instructions for interpretive "overhead") and takes up only 49 bytes of memory. The regular DXYN instruction uses 121 bytes, so 72 bytes are available within the interpreter for other uses; perhaps new instructions. The new DXY- instruction occupies locations 0070 - 00A0, so 00A1 thru 00DF and 00F3 thru 00FB are made available.

It operates exactly like DXYN, except that the N value isn't used. Try it with the CHIP-8 "VIP Kaleidoscope" program. (NOTE: the new instruction doesn't use the I-pointer.)

| ADDRESS | BYTE | 1802 | COMMENTS |
|-------------|------|------|----------|
| INSTRUCTION | | | |

| | | | | |
|------|----|-----|------|------------------|
| 0070 | 15 | INC | R5 | : Bump CHIP-8 PC |
| 71 | 06 | LDN | R6 | : Get VX |
| 72 | F6 | SHR | | |
| 73 | F6 | SHR | | |
| 74 | F6 | SHR | | |
| 75 | FA | ANI | '07' | |
| 76 | 07 | | | |

| | | | |
|------|----|----------|----------------------------------|
| 0077 | 22 | DEC R2 | :Prepare stack pointer |
| 78 | 52 | STR R2 | :Push onto stack |
| 79 | 07 | LDN R7 | :Get VY |
| 7A | FE | SHL | |
| 7B | FE | SHL | |
| 7C | FE | SHL | |
| 7D | F1 | OR | :"OR" with byte on stack |
| 7E | 12 | INC R2 | :Restore stack pointer |
| 7F | AE | PLO RE | :Save result in RE.0 |
| 0080 | 9B | GHI RB | :RB.1 = display byte |
| 81 | BE | PHI RE | :RE now points to display byte |
| 82 | 06 | LDN 06 | :Get VX |
| 83 | FA | ANI '07' | :Lower 3 bits of VX |
| 84 | 07 | | |
| 85 | FC | ADI '99' | :Bit-table offset within page |
| 86 | 99 | | |
| 87 | AD | PLO RD | |
| 88 | 93 | GHI R3 | :Page # for table (this page) |
| 89 | BD | PHI RD | :RD points to table entry |
| 8A | F8 | LDI 'FF' | :Point |
| 8B | FF | | :R6 to |
| 8C | A6 | PLO R6 | :VF |
| 8D | EE | SEX RE | |
| 8E | 0D | LDN RD | :Get table entry |
| 8F | F2 | AND | :Compare to display byte |
| 0090 | 32 | BZ '94' | :Set |
| 91 | 94 | | :VF, |
| 92 | F8 | LDI '01' | :Based |
| 93 | 01 | | :On |
| 94 | 56 | STR R6 | :Hit |
| 95 | 0D | LDN RD | :Get table entry again |
| 96 | F3 | XOR | "Exclusive OR" with display byte |
| 97 | 5E | STR RE | :Modify display byte |
| 0098 | D4 | SEP R4 | :Return |

BYTE PATTERN TABLE - Last 3 bits of X value -
 Select appropriate bit-
 within-byte.

| | |
|------|----|
| 0099 | 80 |
| 9A | 40 |
| 9B | 20 |
| 9C | 10 |
| 9D | 08 |
| 9E | 04 |
| 9F | 02 |
| 00A0 | 01 |

LITTLE LOOPS

by Tom Swan

This column begins a new feature in the VIPER, designed to bring you short programming concepts that can be incorporated into your own custom software. Hopefully, these ideas will help you avoid the snags and bugs that bog you down, and will inspire you to higher levels of creativity with your RCA COSMAC VIP. Please send in your own Little Loops, and we'll try to include them in a future issue.

CHIP-8 doesn't include a "multiply" instruction. While such a routine could be written in machine language, an easier (although not faster) way is to simulate a multiply in CHIP-8. The following algorithm does this, while at the same time demonstrating how the widely published "pseudo-code" form may be translated into an actual program. (Byte and other magazines contain many useful routines presented in this form.)

PROCEDURE

```
Begin
    Answer = 00
    Do - while multiplier ≠ 00
        Add multiplicand to answer
        If overflow is detected, return
        Endif
        Multiplier = multiplier - 01
    Enddo
End
```

Now, if we assign CHIP - 8 variables thusly:

V0 = Multiplicand
V1 = Multiplier
V2 = Answer
VF = Overflow Flag. If VF = 01, there's an overflow. If VF = 00, there's no overflow.

Now we can write a CHIP-8 subroutine, which we'll call MULTIPLY. It will multiply V0 x V1, and place the product in V2. VF will be changed.

```
02F0 6200 :V2=00 (Answer)
F2 4100 :Skip if V1≠ 00
F4 00EE :Return when done; V2 contains the answer.
F6 8204 :V2=V2+V0; Add multiplicand one time
```

```
02F8 4F01 :Skip if VF ≠ 01; Overflow?  
FA 00EE :Return on overflow  
FC 71FF :V1=V1-01; Multiplier - 01  
FE 12F2 :Loop to Multiply. Change this when relocating  
the subroutine.
```

To use the subroutine, set V0 equal to your multiplicand, and V1 equal to your multiplier. Then call the MULTIPLY subroutine, test for overflow, and display V2 - the answer.

Obviously, this routine is limited to numbers less than 256. It may be located anywhere in memory (but be sure to change the jump-to line (02FE) accordingly), but it seems to fit nicely at the end of a page.

Using this subroutine, you should be able to write a program which takes two numbers from the keyboard, multiplies them together, displays the answer, and indicates if an overflow occurred.

Here's another project to consider:

PROJECT: With the same techniques presented here, design a routine to divide two numbers. Try using pseudo-code to express the problem, then write the program directly from that code.

HINT: What do you do when you divide? For example, what do you do with the problem: $8 \div 3$?

Good luck with your programming! Please feel free to write to me at Apartado #38, Taxco, Gro., MEXICO. Send in your Little Loops, or your questions, or just drop me a line to chat. (Stamped envelopes will be appreciated!)

NEXT MONTH: MACHINE LANGUAGE FANTASIES

VIP BLACKJACK
by Robert Rupp

The Rules Of The Game:

VIP Blackjack is played according to Las Vegas rules. The dealer must take a hit if he has 16 points showing, and he must stay with 17 or more. If you have Blackjack (21), the computer (or dealer) will pay you 2 for 1. If the dealer has 21, he wins (or ties, if you also have 21 points). Insurance betting isn't allowed.

You may stay with any card count, but it's wise to take a card if the dealer has 7 or better showing and your points total less than 17. If the dealer has less than 7 showing, or if you have between 12 and 21 points, it's better to stay - let the dealer go bust!

If you receive cards totaling 10 or 11 points on the deal, the computer will ask you if you wish to double down. If you say yes, the computer will deal you one more card, and your original bet will be doubled. If you don't have enough money to double, the VIP will use its own money. This isn't done in Vegas, but was built into this game to make up for not being able to split pairs.

Instructions For Play:

The betting system used in this game is a "count-down" system, and shows the amount of money you have left. If you go to zero, the VIP will automatically deal the cards.

Cards are dealt face up, except for the dealer's second card, which is dealt face down. No suits are used, as they're not really needed. Cards are displayed according to value; i.e., "T" is 10. The dealer's cards are located next to the display marked "D", and the player's cards are next to the letter "P". To receive more cards, you must hit the 1 key. To stop, hit the 0 key.

How The Game Works:

You are given \$10, and must increase this amount to \$100 in order to win the game. You'll discover that money management and card counting are important to win this game. Unlike Vegas, this game uses four 52-card decks, which are played in sequence. The deck number is displayed to the right of the card display. Why only four decks? Because this will inspire you to play a good game, and makes for a more challenging contest between you and the VIP!

Hints:

Counting cards is the fun way to play Blackjack. If you're half-way through one of the decks, and you have been paying attention; and if you notice that mostly small count cards have been played, then it's best to let the dealer bust. For example, if you're dealt 10 and 6, and the dealer has an 8 showing, you may not want to hit - because if all the small count cards have been played, the odds have increased that you'll bust. It just may happen that the VIP doesn't have 17, and therefore will have to take a card. Since you will probably bust (or go over 21 points) anyway, you gain a small edge if the dealer needs a card and you let him go bust - instead of you.

Many books have been written on card counting, and it may increase your fun if you put some of these theories to work against the VIP!

Listing:

| | |
|------------------------------|------------------------------|
| 0200 28 52 6A 8A 00 E0 A5 92 | 0200 13 C6 3E 15 12 DA 23 12 |
| 0208 67 0B 68 00 26 BE A5 AB | 0208 13 AC 17 FC 12 DE A5 C4 |
| 0210 67 0B 68 18 26 BE 6B 00 | 02E0 67 0B 68 00 26 BE 67 11 |
| 0218 6C 00 67 14 68 0B A6 41 | 02E8 68 12 F1 0A 41 01 14 78 |
| 0220 D7 87 8A B5 8C B4 6B 00 | 02F0 12 F4 00 00 31 00 12 EA |
| 0228 A6 CE FA 33 F2 65 78 01 | 02F8 13 30 12 FC 77 07 23 58 |
| 0230 77 07 F1 29 D7 85 77 05 | 0300 8D 60 25 04 6F 00 61 15 |
| 0238 F2 29 D7 85 4A 00 12 58 | 0308 81 D5 4F 01 12 EA 14 12 |
| 0240 40 01 13 D8 40 02 13 E8 | 0310 13 12 F9 29 49 0D A6 69 |
| 0248 FD 0A 4D 00 12 58 3D 01 | 0318 49 0C A6 64 49 0B A6 5F |
| 0250 12 48 7B 01 00 E0 12 1A | 0320 49 0A A6 73 49 01 A6 6E |
| 0258 12 5A 00 E0 A6 A5 67 00 | 0328 67 11 68 09 D7 85 00 EE |
| 0260 68 07 D7 89 A6 AE 68 10 | 0330 23 12 67 11 61 11 80 E0 |
| 0268 D7 89 A6 B7 67 09 68 08 | 0338 6F 00 80 15 4F 00 13 4A |
| 0270 61 00 D7 87 77 07 71 01 | 0340 61 15 81 E5 4F 01 13 74 |
| 0278 31 07 12 72 67 09 68 11 | 0348 14 08 24 1E 77 07 68 09 |
| 0280 61 00 D7 87 77 07 71 01 | 0350 23 58 8E 60 27 78 13 34 |
| 0288 31 07 12 82 24 1E 67 0A | 0358 F6 29 46 0D A6 69 46 0C |
| 0290 68 09 23 58 6D 00 6E 00 | 0360 A6 64 46 0B A6 5F 46 0A |
| 0298 8B 60 83 B0 27 78 24 1E | 0368 A6 73 46 01 A6 6E D7 85 |
| 02A0 78 09 23 58 82 60 84 20 | 0370 26 EC 00 EE 9D E0 13 B8 |
| 02A8 25 04 24 1E 77 07 23 58 | 0378 13 84 60 0C 81 D0 81 05 |
| 02B0 8D 60 25 04 24 1E 89 60 | 0380 3F 01 7D 0A 6F 00 8D E5 |
| 02B8 26 EC 8E 60 27 78 12 C4 | 0388 3F 00 13 90 13 AC 13 90 |
| 02C0 00 00 00 00 3D 15 12 D2 | 0390 67 00 68 1B 8C C4 8A C4 |
| 02C8 9D E0 23 12 9D E0 13 B8 | 0398 A5 DD 26 BE 60 50 F0 18 |

03A0 F0 15 F0 07 30 00 13 A2
03A8 17 F6 13 AC 67 00 68 1B
03B0 A5 F6 26 BE 13 9C 13 B8
03B8 8A C4 67 18 68 1B A6 78
03C0 26 BE 13 9C 13 C6 67 0B
03C8 68 1B 81 C8 8C C4 8C 14
03D0 A5 92 26 BE 8A C4 13 9C
03D8 00 E0 A6 0F 67 0B 68 0B
03E0 26 BE 23 F8 13 D8 13 E8
03E8 00 E0 A6 28 67 0B 68 0B
03F0 26 BE 23 F8 13 E8 13 F8
03F8 68 20 F0 18 61 30 F1 15
0400 F1 07 31 00 14 00 00 EE
0408 67 14 68 1B A5 60 26 BE
0410 13 90 23 12 67 14 68 1B
0418 A5 79 26 BE 13 AC C6 0F
0420 46 0F 14 1E 46 0E 14 1E
0428 46 00 14 1E A6 D1 46 0D
0430 14 7C A6 D2 46 0C 14 7C
0438 A6 D3 46 0B 14 7C A6 D4
0440 46 0A 14 7C A6 D5 46 09
0448 14 7C A6 D6 46 08 14 7C
0450 A6 D7 46 07 14 7C A6 D8
0458 46 06 14 7C A6 D9 46 05
0460 14 7C A6 DA 46 04 14 7C
0468 A6 DB 46 03 14 7C A6 DC
0470 46 02 14 7C A6 DD 14 7C
0478 24 1E 12 FC 17 C4 14 9E
0480 F0 65 48 04 14 1E 75 01
0488 70 01 27 38 A6 91 60 3A
0490 61 0E D0 15 23 F8 60 3A
0498 61 0E D0 15 00 EE 45 68
04A0 17 D0 F0 65 40 08 14 1E
04A8 75 01 70 01 27 38 A6 96
04B0 60 3A 61 0E D0 15 23 F8
04B8 60 3A 61 0E D0 15 00 EE
04C0 45 9C 17 DC F0 65 40 0C
04C8 14 1E 75 01 70 01 27 38
04D0 A6 9B 60 3A 61 0E D0 15
04D8 23 F8 60 3A 61 0E D0 15
04E0 00 EE 45 E0 17 E8 F0 65
04E8 40 10 14 1E 75 01 70 01
04F0 27 38 A6 A0 60 3A 61 0E
04F8 D0 15 23 F8 60 3A 61 0E
0500 D0 15 00 EE 42 01 64 0B
0508 4D 01 15 12 82 D4 84 D4
0510 15 2E 6D 0B 84 D4 6F 00
0518 60 15 00 45 3F 01 15 26

0520 60 01 82 D4 15 2E 6D 01
0528 82 D4 6D 0A 84 D5 92 48
0530 15 4C 6F 00 60 15 80 45
0538 3F 01 15 4C 6F 00 80 28
0540 80 45 3F 01 15 48 15 4C
0548 80 40 00 EE 80 20 00 EE
0550 00 00 00 00 00 00 00 00
0558 00 00 00 00 00 00 00 00
0560 F7 54 57 54 F7 74 54 74
0568 54 57 BC B4 3C 28 2C F5
0570 55 75 55 F7 77 42 72 12
0578 72 E8 A8 E8 88 8E EA AA
0580 EE A4 A4 BC B4 3C 28 2C
0588 F5 55 75 55 F7 77 42 72
0590 12 72 F4 54 74 54 F7 77
0598 54 74 54 57 49 50 60 52
05A0 48 DD 95 9D 95 95 D2 14
05A8 18 14 D2 F7 54 77 54 F7
05B0 73 29 21 29 23 1E 0A 6A
05B8 0A 9E EE 8A EE 8A EA 87
05C0 95 85 95 E7 RE A4 E4 A4
05C8 AE E3 49 41 49 43 00 00
05D0 3E 00 80 45 65 55 4D 45
05D8 C7 55 45 55 C7 8A 8A AA
05E0 FA DA 88 C8 A8 98 88 00
05E8 00 00 00 00 00 00 00 00
05F0 00 00 00 00 00 00 00 00
05F8 8A 8A EE EE 88 EE 28 EE
0600 00 00 00 00 00 00 00 00
0608 00 00 00 00 00 00 00 00
0610 89 A9 F9 DB A2 32 2A 26
0618 A2 39 29 21 2D 39 DB 5F
0620 D5 51 51 72 42 72 40 72
0628 8E 8A 8A 8A EE EE 88 EE
0630 28 EE 39 29 21 2D 39 DB
0638 5F D5 51 51 72 42 72 40
0640 72 20 F8 A0 F8 28 F8 20
0648 00 00 00 00 00 00 00 00
0650 00 00 00 00 00 00 00 00
0658 00 00 00 00 00 00 00 00
0660 20 20 A0 E0 E0 A0 A0 A0
0668 F0 98 A0 C8 A0 90 F0 90
0670 F0 98 98 E0 40 40 40 40
0678 EE 44 44 44 4E E0 80 E0
0680 80 E0 00 00 00 00 00 00
0688 00 00 00 00 00 00 00 00
0690 00 30 10 10 10 38 38 00
0698 38 20 38 38 00 38 00 38

| | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|-----------|
| 06A0 | 28 | 28 | 3C | 08 | 08 | FF | 81 | BD | 07D0 | 6F | 00 | 60 | 67 | 80 | 55 | 3F | 01 |
| 06A8 | 95 | 95 | 95 | BD | 81 | FF | FF | 81 | 07D8 | 14 | C2 | 14 | A2 | 6F | 00 | 60 | 98 |
| 06B0 | BD | A5 | BD | A1 | A1 | 81 | FF | FC | 07E0 | 80 | 55 | 3F | 81 | 14 | E4 | 14 | C4 |
| 06B8 | FC | FC | FC | FC | FC | FC | 60 | 00 | 07E8 | 6F | 00 | 60 | CF | 80 | 55 | 3F | 01 |
| 06C0 | D7 | 85 | 61 | 05 | F1 | 1E | 27 | 32 | 07F0 | 13 | E8 | 14 | E6 | EA | F6 | 3A | 00 |
| 06C8 | 30 | 05 | 16 | C8 | 00 | EE | 00 | 00 | 07F8 | 12 | 84 | 13 | E8 | 4D | 88 | 18 | 04 |
| 06D0 | 09 | 01 | 00 | 01 | 01 | 01 | 01 | 01 | 0800 | 3D | 0A | 12 | DE | 67 | 88 | 68 | 00 |
| 06D8 | 00 | 01 | 00 | 00 | 00 | 01 | 01 | 00 | 0808 | A8 | 38 | 26 | BE | F0 | 0A | 40 | 01 |
| 06E0 | 23 | F8 | A6 | 78 | 60 | 10 | 61 | 18 | 0810 | 18 | 18 | 40 | 00 | 18 | 2A | 18 | 8C |
| 06E8 | 26 | BE | 00 | EE | 46 | 00 | 66 | 0A | 0818 | 8A | C5 | 8C | C4 | 24 | 1E | 67 | 18 |
| 06F0 | 46 | 0C | 66 | 0A | 46 | 00 | 66 | 0A | 0820 | 68 | 12 | 23 | 58 | 80 | 60 | 25 | 04 |
| 06F8 | 00 | EE | 60 | 00 | A6 | D1 | F0 | 55 | 0828 | 13 | 30 | R8 | 38 | 67 | 0B | 68 | 00 |
| 0700 | A6 | D2 | F0 | 55 | A6 | D3 | F0 | 55 | 0830 | 26 | BE | 12 | DE | 00 | 00 | 00 | 00 |
| 0708 | A6 | D4 | F0 | 55 | A6 | D5 | F0 | 55 | 0838 | F5 | 55 | 55 | 55 | F7 | 7A | 2A | 3A |
| 0710 | A6 | D6 | F0 | 55 | 76 | D7 | F0 | 55 | 0840 | 2A | 7B | 0C | 24 | 05 | 24 | 8E | 45 |
| 0718 | A6 | D8 | F0 | 55 | A6 | D9 | F0 | 55 | 0848 | 65 | 55 | 40 | 45 | C7 | 55 | 45 | 55 |
| 0720 | A6 | DA | F0 | 55 | A6 | DB | F0 | 55 | 0850 | C7 | 44 | 65 | 00 | 26 | FA | 00 | EE |
| 0728 | A6 | DC | F0 | 55 | A6 | DD | F0 | 55 | 0858 | 2B | BB |
| 0730 | 00 | EE | 70 | 01 | 77 | 03 | 00 | EE | 0860 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 |
| 0738 | 46 | 00 | A6 | D1 | 46 | 0C | A6 | D2 | 0868 | BB |
| 0740 | 46 | 0B | A6 | D3 | 46 | 0A | A6 | D4 | 0870 | 44 | 46 | 44 | 44 | 44 | 44 | 44 | 44 |
| 0748 | 46 | 09 | A6 | D5 | 46 | 03 | A6 | D6 | 0878 | BB |
| 0750 | 46 | 07 | A6 | D7 | 46 | 06 | A6 | D8 | 0880 | 94 | 64 | 64 | 7D | 57 | 35 | F4 | 5C |
| 0758 | 46 | 05 | A6 | D9 | 46 | 04 | A6 | DA | 0888 | 38 | 3B | 3B | 40 | 2B | 6A | 1B | BB |
| 0760 | 46 | 03 | A6 | DB | 46 | 02 | A6 | DC | 0890 | E4 | 54 | 54 | 44 | FD | E4 | 65 | A6 |
| 0768 | 46 | 01 | A6 | DD | F0 | 55 | 00 | EE | 0898 | 0A | R2 | 3B | 9B | 5A | AB | 9A | 6B |
| 0770 | 49 | 00 | 89 | 60 | 14 | 7C | 00 | 00 | 08A0 | 45 | 44 | 4C | 44 | 05 | 40 | 44 | 44 |
| 0778 | 4B | 01 | 63 | 0B | 4E | 01 | 17 | 86 | 08A8 | 59 | BB | BB | AB | FB | 3B | BB | B3 |
| 0780 | 8B | E4 | 83 | E4 | 17 | R2 | 6E | 0B | 08B0 | 44 | DF | 64 | 45 | 44 | 40 | C5 | 44 |
| 0788 | 83 | E4 | 6F | 00 | 60 | 15 | 80 | 35 | 08B8 | BF | 94 | BB | BB | BB | FB | BB | BB |
| 0790 | 3F | 01 | 17 | 9A | 6E | 01 | 8B | E4 | 08C0 | 44 | CC | 44 | 44 | 44 | 44 | 44 | 45 |
| 0798 | 17 | R2 | 6E | 01 | 8B | E4 | 6E | 0A | 08C8 | BB | BB | BB | 9B | BB | BB | BB | BB |
| 07A0 | 83 | E5 | 9B | 30 | 17 | C0 | 6F | 00 | 08D0 | 44 | 44 | 44 | 44 | R4 | 44 | 44 | 44 |
| 07A8 | 60 | 15 | 80 | 35 | 3F | 01 | 17 | C0 | 08D8 | BB | BB | BB | AB | BB | BB | BB | BB |
| 07B0 | 6F | 00 | 80 | B0 | 80 | 35 | 3F | 01 | 08E0 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 |
| 07B8 | 17 | BC | 17 | C0 | 8E | 30 | 00 | EE | 08E8 | BB |
| 07C0 | 8E | B0 | 00 | EE | 6F | 00 | 60 | 33 | 08F0 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 |
| 07C8 | 80 | 55 | 3F | 81 | 14 | A0 | 14 | 00 | 08F8 | BB | BB |

TREASURE HUNT
by Stanley P. Bayless

This is a CHIP-8 program which some of my friends seem to enjoy, and I thought I'd pass it along to VIPER readers. It is an adaptation of Donald Spencer's "Buried Treasure, in Game Playing With BASIC, page 113.

The game is played on a 10 x 10 grid; ten columns up and down, and ten rows across; all addressed as 0 through 9. The VIP buries a 4 x 1 treasure chest of gold randomly vertically or horizontally. Your job is to locate the treasure by "digging holes". You input a row number and a column number, and the VIP checks the grid. Appropriate messages are returned. You get to dig ten holes - unless you find the treasure.

You don't have to reset the VIP between games; restart is permitted by pressing "C" (for "clear") on the keyboard.

The program requires six pages, beginning with 0000 and using the original CHIP-8 at 0000 to 01FF. Location 05FF has an EF, for a check byte. I'm using a standard VIP, with 4K of RAM.

| | |
|------------------------------|------------------------------|
| 0200 A6 00 60 00 61 00 62 00 | 02A0 F0 55 F0 55 F0 55 F0 55 |
| 0208 F0 55 41 63 12 14 71 01 | 02A8 23 E6 24 04 6C 0A 24 22 |
| 0210 F2 1E 12 08 63 00 A6 00 | 02B0 24 7E 24 94 24 B0 24 A2 |
| 0218 60 01 61 00 62 01 43 05 | 02B8 24 BA 23 24 30 02 12 C4 |
| 0220 12 46 F0 55 41 04 12 2E | 02C0 23 24 12 D8 40 03 12 E3 |
| 0228 71 01 F2 1E 12 1E F2 1E | 02C8 60 02 F0 55 23 24 24 7E |
| 0230 F2 1E 61 00 62 01 F0 55 | 02D0 7C FF 24 7E 4C 00 12 EE |
| 0238 41 04 73 01 41 04 12 18 | 02D8 24 22 25 1A 25 58 24 B0 |
| 0240 F2 1E 71 01 12 36 6E 00 | 02E0 24 BA 25 1A 24 22 12 B2 |
| 0248 4E 0A 12 5A 6D 00 23 24 | 02E8 63 00 60 00 F0 55 6E 00 |
| 0250 7D 01 3D 0A 12 4E 7E 01 | 02F0 4E 0A 13 06 6D 00 23 24 |
| 0258 12 48 CB 01 3B 00 12 90 | 02F8 30 03 23 24 7D 01 3D 0A |
| 0260 C0 FF 6D 0A 03 C6 6D 09 | 0300 12 F6 7E 01 12 F0 4C 00 |
| 0268 6E 07 03 C6 6E 00 A6 00 | 0308 13 16 24 22 24 7E 7C FF |
| 0270 85 E0 66 0A 03 5C 87 D4 | 0310 24 7E 24 C4 13 1A 24 22 |
| 0278 F7 1E 60 03 3B 00 12 A0 | 0318 24 F2 FC 0A 3C 0C 13 1A |
| 0280 F0 55 67 09 F7 1E F0 55 | 0320 00 E0 12 00 68 00 85 E0 |
| 0288 F7 1E F0 55 F7 1E 12 A6 | 0328 66 0A 03 5C 87 D4 A6 00 |
| 0290 C0 FF 6D 07 03 C6 6D 01 | 0330 F7 1E 38 00 00 EE F0 65 |
| 0298 6E 0A 03 C6 6E 07 12 6E | 0338 85 D0 66 03 03 5C 89 70 |

0340 85 E0 66 03 03 5C 8A 70
0348 A5 CA 40 03 A5 D0 40 02
0350 A5 C8 40 01 A5 CD D9 A3
0358 68 01 13 26 96 BC F8 F5
0360 AC F8 05 BD F8 DC AD F8
0368 00 ED 73 73 73 73 73 73
0370 5D 1D 4C 5D 1D 1D 4C 5D
0378 1D 1D 73 2D F8 00 5D 1D
0380 1D 1D F8 01 5D ED FD 10
0388 3B B7 2D 2D 2D F0 FE 50
0390 2D F0 7E 5D 1D 1D 1D F0
0398 FE 73 F0 7E 73 3B AE F0
03A0 2D 2D F4 1D 1D 73 F0 2D
03A8 2D 74 1D 1D 5D 1D 1D 1D
03B0 1D F0 FC 01 5D 30 86 2D
03B8 2D 2D F0 5C 2D F0 1C 1C
03C0 1C 1C 1C 1C 1C D4 F8 03
03C8 BC F8 DB AC 25 25 25 45
03D0 5C 15 15 15 96 BD F8 F0
03D8 AD 00 FF 07 33 DA FB FF
03E0 FC 00 55 25 D4 00 69 20
03E8 6A 00 A5 A0 D9 A5 79 05
03F0 A5 9B D9 A5 79 05 A5 B4
03F8 D9 A5 79 05 7A FF A5 BE
0400 D9 A6 00 EE 69 20 6A 01
0408 A5 6E D9 A5 79 05 A5 98
0410 D9 A5 79 05 A5 91 D9 A5
0418 79 05 7A FF A5 BE D9 A6
0420 00 EE 69 20 6A 0F A5 87
0428 D9 A5 79 05 A5 98 D9 A5
0430 79 05 A5 91 D9 A5 79 05
0438 A5 78 D9 A5 79 05 A5 A5
0440 D9 A5 69 20 6A 15 A5 91
0448 D9 A5 79 05 A5 78 D9 A5
0450 79 05 A5 7D D9 A5 79 05
0458 A5 AA D9 A5 79 08 A5 AA
0460 D9 A5 79 05 A5 9B D9 A5
0468 69 20 6A 1B A5 73 D9 A5
0470 79 05 A5 8C D9 A5 79 04
0478 A5 82 D9 A5 00 EE 69 32
0480 6A 1B A5 D4 FC 33 F2 65
0488 F1 29 D9 A5 79 06 F2 29
0490 D9 A5 00 EE FD 0A 68 0A
0498 8D 85 3F 00 14 94 8D 84

04A0 00 EE FE 0A 68 0A 8E 85
04A8 3F 00 14 A2 8E 84 00 EE
04B0 69 38 6A 01 FD 29 D9 A5
04B8 00 EE 69 38 6A 08 FE 29
04C0 D9 A5 00 EE 69 20 6A 13
04C8 A5 87 D9 A5 79 05 A5 AF
04D0 D9 A5 79 05 A5 A0 D9 A5
04D8 79 05 A5 A0 D9 A5 79 05
04E0 A5 64 D9 A5 79 05 A5 B9
04E8 D9 A5 79 06 A5 C4 D9 A6
04F0 00 EE 69 20 6A 13 A5 AA
04F8 D9 A5 79 06 A5 9B D9 A5
0500 79 05 A5 9B D9 A5 79 07
0508 A5 69 D9 A5 79 05 A5 64
0510 D9 A5 79 05 A5 73 D9 A5
0518 00 EE 69 27 6A 0F A5 96
0520 D9 A5 79 05 A5 9B D9 A5
0528 79 05 A5 AA D9 A5 69 21
0530 6A 15 A5 AA D9 A5 79 06
0538 A5 87 D9 A5 79 05 A5 78
0540 D9 A5 79 05 A5 A0 D9 A5
0548 79 05 A5 78 D9 A5 79 05
0550 A5 C4 7A FF D9 A6 00 EE
0558 68 20 F8 15 F8 07 38 00
0560 15 5C 00 EE 60 90 F0 90
0568 90 E0 90 E0 90 E0 60 90
0570 80 90 60 E0 90 90 90 E0
0578 F0 80 E0 80 F0 F0 80 E0
0580 80 80 60 90 80 B0 70 90
0588 90 F0 90 90 E0 40 40 40
0590 E0 80 80 80 80 F0 90 00
0598 B0 B0 90 60 90 90 90 60
05A0 E0 90 E0 A0 90 70 80 60
05A8 10 E0 F8 20 20 20 20 90
05B0 90 90 90 60 88 A8 A8 F8
05B8 50 88 50 20 20 20 60 90
05C0 30 20 00 20 40 40 40 40
05C8 00 40 00 00 00 E0 E0 E0
05D0 A0 40 A0 00 00 01 00 00
05D8 00 00 00 00 11 55 25 D4
05E0 79 05 A2 A8 D9 A5 79 05
05E8 A5 F4 D9 A5 79 06 A3 86
05F0 D9 A6 00 EE 88 50 20 20
05F8 20 EE 00 01 09 99 00 EF

An Adaptation of
 PHIL SUMNER'S IMPROVED VIP KALEIDOSCOPE*
 in CHIP-8X for the VP590 Color Board,
 by Bob Hayes, Lompoc, Calif.

| <u>Address:</u> | <u>Code:</u> | <u>Comments:</u> |
|-----------------|--------------|---------------------------------------|
| 0342 | 1400 | Go to 0400 |
| 0330 | 142C | Go to 042C |
| 0400 | 4001 | Skip if V0#01 |
| 0402 | 1414 | Go to 0414 |
| 0404 | 4003 | Skip if V0#03 |
| 0406 | 141A | Go to 041A |
| 0408 | 4007 | Skip if V0#07 |
| 040A | 1420 | Go to 0420 |
| 040C | 4009 | Skip if V0#09 |
| 040E | 1426 | Go to 0426 |
| 0410 | A382 | I=0382 (same as old 0342) |
| 0412 | 1344 | Go to 0344 (Return to Main Program) |
| 0414 | 71FF | Add FF to V1 |
| 0416 | 72FF | Add FF to V2 |
| 0418 | 1410 | Go to 0410 |
| 041A | 7101 | Add 01 to V1 |
| 041C | 72FF | Add FF to V2 |
| 041E | 1410 | Go to 0410 |
| 0420 | 71FF | Add FF to V1 |
| 0422 | 7201 | Add 01 to V2 |
| 0424 | 1410 | Go to 0410 |
| 0426 | 7101 | Add 01 to V1 |
| 0428 | 7201 | Add 01 to V2 |
| 042A | 1410 | Go to 0410 |
| 042C | 690F | V9=0F |
| 042E | E99E | Skip if V9=Key |
| 0430 | 131E | Go to 031E |
| 0432 | 690B | V9=0B |
| 0434 | E99E | Skip if V9=Key |
| 0436 | 143E | Go to 043E |
| 0438 | 02A0 | Change Background |
| 043A | E9A1 | Skip if V9#Key |
| 043C | 143A | Go to 043A |
| 043E | 6900 | V9=00 |
| 0440 | E99E | Skip if V9=Key |
| 0442 | 1432 | Go to 0432 (Loop in Freeze Condition) |
| 0444 | 131E | Go to 031E (Return to Main Program) |

*from VIPER, April 1979, Volume 1, Issue 9

Checks to see if
 key 1, 3, 7, or 9
 are pressed. If not,
 return to main program.

Set pattern for
 key 1, 3, 7, or 9.
 Then return to main
 program.

Provides Freeze and
 Background color change.

Key F = Freeze Action
 Key O = Resume Action
 Key B = Background Color
 Change

VIP CRAPS
by Robert Rupp

| | |
|------------------------------|---------------------------------|
| 0200 6A 0A 00 E0 A4 00 61 0F | 0330 65 03 A4 64 23 38 13 4A |
| 0208 62 00 23 38 A4 32 61 16 | 0338 63 00 D1 25 66 05 F6 1E |
| 0210 62 18 23 38 6B 00 6C 00 | 0340 71 08 73 01 33 05 13 3A |
| 0218 64 19 65 0C A5 3D D4 57 | 0348 00 EE 61 15 62 18 A4 32 |
| 0220 8A B5 0C B4 6B 00 A6 00 | 0350 23 38 FF 0A 3F 0F 13 52 |
| 0228 FA 33 F2 65 75 01 74 07 | 0358 12 5A 94 90 13 64 44 07 |
| 0230 F1 29 D4 55 74 05 F2 29 | 0360 13 80 13 4A 61 12 62 00 |
| 0238 D4 55 4A 00 12 58 F0 29 | 0368 8C 04 8C 54 8A C4 A4 AF |
| 0240 40 01 13 8C 40 02 13 9A | 0370 23 38 60 50 F0 18 F0 15 |
| 0248 FF 0A 4F 0F 12 58 3F 01 | 0378 F0 07 30 00 13 78 12 02 |
| 0250 12 48 7B 01 00 E0 12 18 | 0380 8A B5 A4 C8 61 15 62 00 |
| 0258 6D 00 6E 00 00 E0 61 17 | 0388 23 38 13 72 00 E0 A4 E1 |
| 0260 62 0A C7 07 47 00 12 62 | 0390 61 0C 62 0C 23 38 23 A8 |
| 0268 47 07 12 62 C8 07 48 00 | 0398 13 8C 00 E0 A4 FA 61 0C |
| 0270 12 6C 48 07 12 6C 22 90 | 03A0 62 0C 23 38 23 A8 13 9A |
| 0278 84 70 84 84 87 80 71 0B | 03A8 60 40 F0 18 61 40 F1 15 |
| 0280 22 90 7E 01 3E 0A 12 5C | 03B0 F1 07 31 00 13 B0 00 EE |
| 0288 7D 01 3D 01 13 5A 12 B6 | 03B8 23 A8 65 00 6B 00 12 02 |
| 0290 47 01 A5 14 47 02 A5 1E | 03C0 65 00 13 64 7F E7 B6 FB |
| 0298 47 03 A5 28 47 04 A5 32 | 03C8 FD D5 FF 9F 04 41 00 E0 |
| 02A0 47 05 A5 4A 47 06 A5 54 | 03D0 0C 32 04 88 6F 76 76 7B |
| 02A8 D1 2A 66 01 F6 18 00 EE | 03D8 C2 1E E9 7D 43 03 40 11 |
| 02B0 47 06 D1 27 00 EE 44 02 | 03E0 59 84 DD 18 7A F3 A2 21 |
| 02B8 13 B8 44 03 13 B8 44 0C | 03E8 59 07 5F FF 02 AB 24 00 |
| 02C0 13 B8 44 07 13 C0 44 0B | 03F0 18 C0 D5 C9 E3 74 B3 6B |
| 02C8 13 C0 89 40 A4 4B 61 12 | 03F8 9F CD D7 DF 24 00 02 00 |
| 02D0 62 00 23 38 64 2C 65 00 | 0400 EE 8A 8C 8A EA EE AA EE |
| 02D8 49 0A A5 44 39 0A F9 29 | 0408 A8 A8 E3 81 E1 21 E3 DD |
| 02E0 D4 55 A4 19 61 03 62 18 | 0410 50 DC 50 DC C6 92 82 92 |
| 02E8 23 38 A4 32 61 28 62 18 | 0418 87 EF A5 A5 A5 EF 7B 2A |
| 02F0 23 38 FF 0A 4F 0F 12 5A | 0420 2B 2B 7B 87 35 85 B5 87 |
| 02F8 3F 00 12 F2 00 E0 61 0D | 0428 00 00 3F 00 00 00 00 00 00 |
| 0300 62 0A 49 06 13 24 49 08 | 0430 00 00 F7 D5 F5 A5 B7 44 |
| 0308 13 24 49 05 13 16 49 09 | 0438 44 44 44 77 0E 68 0E 68 |
| 0310 13 16 49 04 13 2E 49 0A | 0440 00 00 00 00 00 00 00 00 00 |
| 0318 13 2E 6B 04 65 06 A4 96 | 0448 00 00 00 EE AA EA 8A 8E |
| 0320 23 38 13 4A 6B 05 65 06 | 0450 A5 B4 BC AC A4 C0 9F 00 |
| 0328 A4 7D 23 38 13 4A 6B 04 | 0458 9F 00 00 00 00 00 00 00 00 |

| | |
|------------------------------|------------------------------|
| 0460 00 00 00 00 3D 15 1D 15 | 05C0 00 0A 48 11 E8 FF F7 F7 |
| 0468 3D DC 03 C8 08 C8 A3 R2 | 05C8 6D 03 5C A8 F3 B2 B5 D0 |
| 0470 F3 22 22 BA AA BB 29 29 | 05D0 11 01 0C 0C F3 77 FF FB |
| 0478 9C 94 9C 14 1C 3D 15 1D | 05D8 0F DC 5D 99 54 24 20 7A |
| 0480 15 3D DC 08 C8 08 C8 E3 | 05E0 03 0C 88 28 F7 7D 77 F7 |
| 0488 82 E3 22 E2 BA AA BB 29 | 05E8 18 01 DF 5F 11 36 32 09 |
| 0490 29 9C 90 9C 14 1C 3D 15 | 05F0 00 06 48 81 F5 77 6A F3 |
| 0498 1D 15 3D DC 08 C8 08 C8 | 05F8 C6 E9 9C 55 F0 25 31 04 |
| 04A0 R3 R2 F3 22 22 BA AA BB | 0600 00 01 08 58 29 A1 14 8C |
| 04A8 29 29 9C 90 9C 14 1C 8B | 0608 A5 A0 13 0A 46 60 46 26 |
| 04B0 89 A9 F9 DB R2 32 2A 26 | 0610 54 48 81 11 83 30 24 42 |
| 04B8 R2 8B CA AB 9A 8B BC 34 | 0618 04 99 84 8B 12 C8 74 30 |
| 04C0 BC 28 AC 00 00 00 00 00 | 0620 93 E8 8C 6A F9 15 F9 87 |
| 04C8 8E 8A 8A 8A EE EE 88 EE | 0628 39 00 16 26 7A 01 69 02 |
| 04D0 28 EE 55 55 55 00 55 00 | 0630 F9 18 4A 64 13 F6 16 14 |
| 04D8 00 00 00 00 00 00 00 00 | 0638 EA 8A EE 2A EA EE 48 4E |
| 04E0 00 8B 89 A9 F9 DB R2 32 | 0640 48 EE 8F 85 85 85 EF 8E |
| 04E8 2A 26 R2 39 29 21 2D 39 | 0648 28 0E 28 00 00 00 00 00 |
| 04F0 DB 5F D5 51 51 72 42 72 | 0650 00 00 17 36 C1 03 41 00 |
| 04F8 40 72 8E 8A 8A 8A EE EE | 0658 16 92 41 01 16 96 41 02 |
| 0500 88 EE 28 EE 39 29 21 2D | 0660 16 9A A6 81 67 00 68 01 |
| 0508 39 DB 5F D5 51 51 72 42 | 0668 D7 8F 77 00 37 40 16 68 |
| 0510 72 40 72 F8 FF FF FF FF | 0670 67 00 68 10 D7 8F 77 00 |
| 0518 E7 E7 FF FF FF FF FF 9F | 0678 37 40 16 74 16 R2 09 86 |
| 0520 9F FF FF FF FF F9 F9 FF | 0680 FB 05 32 10 R8 96 CD 69 |
| 0528 FF 9F 9F FF E7 E7 FF F9 | 0688 00 0A 75 54 20 BF E0 88 |
| 0530 F9 FF FF 99 99 FF FF FF | 0690 D6 89 A6 7E 16 64 A6 7F |
| 0538 FF 99 99 FF F8 28 F8 A0 | 0698 16 64 A6 88 16 64 16 A2 |
| 0540 F8 28 F8 20 CE 4A 4A 4A | 06A0 00 00 34 00 16 B2 16 AC |
| 0548 EE 99 FF 99 99 FF E7 E7 | 06A8 00 00 61 01 C4 07 44 00 |
| 0550 FF 99 99 FF FF 99 99 FF | 06B0 64 03 44 07 16 D6 44 06 |
| 0558 99 99 FF 99 99 FF F7 31 | 06B8 16 DE 44 05 16 E6 44 04 |
| 0560 08 08 08 31 FE F7 37 A3 | 06C0 16 EE 44 03 16 F6 44 02 |
| 0568 0A AC AD 4F 35 F2 48 81 | 06C8 16 FE 44 01 17 06 67 34 |
| 0570 00 02 00 01 7F 77 EF 1F | 06D0 68 14 27 10 17 24 67 25 |
| 0578 91 8A D3 DF 43 A2 22 02 | 06D8 68 14 27 10 17 24 67 14 |
| 0580 0C 08 49 05 FF E5 F3 FD | 06E0 68 14 27 10 17 24 67 04 |
| 0588 3B 99 FD 98 E1 49 AA D0 | 06E8 68 14 27 10 17 24 67 33 |
| 0590 08 08 09 02 F6 7C 7F 36 | 06F0 68 03 27 10 17 24 67 24 |
| 0598 CF 8F 8D 08 F4 D4 75 F6 | 06F8 68 03 27 10 17 24 67 13 |
| 05A0 84 01 08 00 F9 FF FF F2 | 0700 68 03 27 10 17 24 67 03 |
| 05A8 9D BD 8E EB F1 EB D5 48 | 0708 68 03 27 10 17 24 00 00 |
| 05B0 0C 0D 44 0C FE FF FF 76 | 0710 C6 07 C5 07 87 64 88 54 |
| 05B8 97 9D 9A F8 23 E2 19 B1 | 0718 A6 88 D7 81 66 02 F6 18 |

0720 D7 81 00 EE E4 A1 17 40
0728 F3 07 33 00 7A 01 43 00
0730 7A 04 16 54 16 54 6A 00
0738 64 00 63 FF F3 15 16 54
0740 00 E0 23 AC 00 E0 A8 20
0748 67 08 68 00 24 2A 67 34
0750 F4 29 D7 85 A8 39 67 0B
0758 68 08 24 2A A8 52 67 0B
0760 68 10 24 2A 6C FF FC 15
0768 FC 07 4C 00 7A 02 4C 00
0770 F7 18 61 01 62 02 E1 A1
0778 17 8A E2 A1 18 BC 17 68
0780 A8 6B 67 0B 68 00 24 2A
0788 00 EE 00 E0 23 AC 00 E0

0790 27 80 67 18 68 08 28 9E
0798 C1 0F C2 0F 67 1A 68 10
07A0 F1 29 D7 85 77 06 F2 29
07A8 D7 85 6C 3C FC 15 FC 07
07B0 E1 A1 17 B8 28 14 17 B8
07B8 28 14 17 BC E2 9E 17 B8
07C0 12 02 27 80 67 14 68 08
07C8 28 AA C1 0F C2 0F C3 0F
07D0 C4 0F 67 10 68 10 F1 29
07D8 D7 85 77 07 F2 29 D7 85
07E0 77 07 F3 29 D7 85 77 07
07E8 F4 29 D7 85 6C B4 17 F0
07F0 FC 15 FC 07 E1 A1 17 FC
07F8 28 14 17 F4 E2 A1 18 04

Do you really enjoy the VIP Games? How about sending us your games for publication? For example, we have yet to receive a game for two players, using the auxilliary key pad. We know for a fact there are some of those keypads out there in the world somewhere...

Also - for those of you who don't want to type in all the code for the games we publish, we do offer the programs on cassette for \$5.00 (to cover our costs) to subscribers. Currently we have several: the Hersh Editor, and Udo Pernisz's LUNAR LANDER, and now BLACKJACK, TREASURE HUNT, and CRAPS. We sell (and pay royalties for) Brian Astle's LIFE and Clarke Hottle's BASEBALL. We also offer the tape and documentation for Don Stein's Editor for \$15.00 (primarily to cover copying costs and postage; the paper is voluminous and heavy). Just send your check with a list of the programs you want & we'll mail them out within a week. (BAC/VISA/MC orders by phone: (301) 730-5186)

PIPs For VIPS - by Tom Swan
Available from ARESCO
Price (until July 15) \$14.95
Including cassette tape

Price (after July 15) \$14.95
Cassette tape price \$ 5.00
(Total package cost) \$19.95

CONTENTS INCLUDE:
Text Editor 21
Disassembler 7
CHIP-8 Editor
Character Designer
Messenger
Space Wars
Surround

The VIP was designed for creating programs which utilized the display capabilities of the 1802 microprocessor, coupled with the 1861 video display generator. This simple, elegant combination has provided hundreds of hours of fun and education for thousands of VIP owners. The excellent set of games and displays available in the VIP Instruction Manual provided the springboard for dozens of programs we have published in the VIPER.

Although the VIP was never intended to display more than a few alphabetic characters (mostly messages incidental to some game program), there has been a continuing interest on the part of VIP users in displaying text on the VIP. A first step in this direction was the publication in an early issue of the VIPER of a higher resolution interrupt subroutine, permitting twice as many lines of text on a single screen. This format, allowing up to sixteen lines of sixteen characters each, is the display format used in several programs presented in Tom Swan's new book, PIPS FOR VIPS.

In part, the book is an exploration of the text capabilities of the VIP. The Character Designer, coupled with the Messenger, allows easy display of text messages under CHIP-8 control, giving the programmer virtually unlimited capability to design his own character sets. These capabilities are elegantly demonstrated in the Text Editor 21 and the Disassembler 7 programs, which give the VIP capabilities its designers probably never even imagined.

In addition, Tom provides two game programs, Surround and Space Wars, which are among the best games ever designed for the VIP. PIPS FOR VIPS is rounded out by a good utility program in the CHIP-8 Editor, which you'll find useful in loading and examining the other programs Tom presents.

Although the programs are valuable in themselves, the wealth of information available in each program listing provides a sort of "graduate course" in VIP programming. Careful study of the programs should give you new insight into the use of both CHIP-8 and 1802 code on the VIP. The exhaustive documentation will allow you to modify any of the programs to meet your special needs or desires, and several of the programs will be even more valuable if interfaced to an external keyboard such as the VP600 provided by RCA.

PIPS FOR VIPS is available until July 15, 1979, at a special pre-publication price of \$14.95 for both the book and a tape containing all the programs. After July 15, the tape will be priced separately at \$5.00, and will not be sold to people who have not purchased the book.

VIP HARDWARE AND SOFTWARE

The prices here are believed to be accurate and effective as of June 1, 1979. You may order RCA produced items from ARESCO, as well as the VIP software. Be sure to write on your order for any RCA products that you are aware that delivery may take more than 30 days.

RCA PRODUCED PRODUCTS

| | | |
|-----------|--------------------------------------------------------------------------------------------|----------|
| VP44 | Four 2114 RAMs for on-board expansion..... | \$ 36.00 |
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| VP311 | VIP Instruction Manual..... | 5.00 |
| VP320 | VIP User Guide..... | 5.00 |
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| VP565 | EPROM Programmer Board..... | 99.00 |
| VP570 | Memory Expansion (4K static RAM)..... | 95.00 |
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| VP585 | Keypad Interface Board..... | 10.00 |
| VP590 | Color Board..... | 69.00 |
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| VP600 | ASCII Keyboard..... (available 2nd quarter). | 49.00 |
| VP700 | Tiny BASIC ROM Board..... | 39.00 |
| VP710 | VIP Game Manual..... (20 games)..... | 10.00 |
| VP711 | VIP (Assembled)..... | 249.00 |
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| MPM201B | CDP 1802 User Manual..... | 5.00 |

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| | |
|---------------------------------------------------------------------------------------------------------------|-------|
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| Stanley Bayless's TREASURE HUNT (cassette only)..... | 5.00 |
| Robert Rupp's CRAPS (cassette only)..... | 5.00 |
| Tom Swan's PIPS FOR VIPS (book and cassette until 7/15/79) | 14.95 |
| Tom Swan's PIPS FOR VIPS (book and cassette after 7/15/79) | 19.95 |
| The book will be sold without the cassette, for 14.95, but the cassette will not be sold without the book. | |

We also have the 1861 data sheet (for \$1.50). Please send an additional \$1.00 for postage and handling if you order an RCA item. RCA charges us postage from their plant to our house, and we prepay shipping from our house to yours. Your dollar will help defray the costs of all that!

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COLUMBIA, MD. 21044
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Before ordering products from ARESCO, please read this notice! We, like everyone else, must wait in line for RCA to deliver product to us. We have an advantage over the individual VIP owner, however, in that we can telephone a purchase order number and pay for the product when it arrives rather than by pre-payment. We do not cash your check, nor charge your credit card, until the day we ship your merchandise to you. So you will have the use of those funds, rather than RCA or ARESCO, until then. Secondly, we do not, as a rule, stock any items listed as available from RCA. We don't have the capital to handle that. Therefore, you must make note on any order for RCA products that you are aware that shipment may take more than 30 days. It usually does. And, finally, we cannot accept purchase orders ourselves. We have found that purchase orders from even the most reputable firms do not get paid in time to meet our needs, and we don't have the capital to handle that, either.

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